

**STUDIES ON THE TAXONOMY, DISTRIBUTION, AND
ABUNDANCE OF *THALICTRUM TEXANUM*
(RANUNCULACEAE)**

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ABSTRACT

Field and herbarium studies show *Thalictrum texanum*, a species of conservation concern, to be distinct from both *T. arkansanum* and *T. debile*. The species, which is endemic to southeast Texas, is documented to occur in eight counties. A description of the species, list of exsiccatae, distribution map, discussion of its abundance and environment, and comments on its conservation status are also included.

KEY WORDS: Ranunculaceae, *Thalictrum*, Texas.

Currently, six species of the genus *Thalictrum* are recognized as occurring in Texas (Turner et al. 2003). Two of these, *T. dasycarpon* Fischer & Avé-Lallemant and *T. revolutum* DC., are of widespread distribution in southeastern United States, while *T. fendleri* Engelm. ex A. Gray is extensively distributed in southwestern United States and northern Mexico. *Thalictrum arkansanum* B. Boivin, a poorly known species, is limited in distribution, according to Park and Festerling (1997), to southern Arkansas, southeastern Oklahoma, and adjacent northeast Texas. However, the species is also reported to occur in Angelina, Houston, and San Augustine counties in central east Texas (Turner et al. 2003). The widespread eastern species, *T. thalictroides* (L.) A. J. Eames & B. Boivin, known from only Lamar and Red River counties in northeast Texas, has only recently been discovered in the state (Singhurst and Holmes 1998). Finally, the subject of this report, *Thalictrum texanum* (A. Gray) Small, is considered to be a Texas endemic (Correll and Johnston 1970) and, until now, was known only from three counties in the lower Brazos River area, northwest of the city of Houston (Turner et al. 2003). Park and Festerling (1997), who mention that the species is known from only two extant populations, consider the species to be of conservation concern. The species is said to be inconspicuous (Mahler 1983) and somewhat difficult to locate in the field (Park and Festerling 1997). Presently, *T. texanum* is classified as a plant species of concern (G2S2) (Poole et al. 2004), but there is concern that it may be the same as *T. debile* Buckley or better treated as a variety of that species. Park and Festerling (1997), under the treatment of *T. debile* Buckley, state that *T. texanum* is closely related to *T. arkansanum* and *T. debile* and that "The distinctions among the three species should be further studied."

The purpose of this paper is to (1) determine if there is sufficient reason to support the recognition of *Thalictrum texanum* as a species distinct from *T. arkansanum* and *T. debile*, and if so; (2) furnish information on its distribution and population; (3) discuss the general ecology of the species; and (4) make a recommendation as to the conservation status of the species.

METHODS

The study originated with examination of *Thalictrum* specimens in three herbaria (BAYLU, SBSC, and TEX/LL) to obtain a basic distribution of and the ecological preferences of the species. The holotype (*Hall 3*) was generously loaned to the researchers by the Gray Herbarium of Harvard University. These data were used to select prospective sites for field studies, which were concentrated in Austin, Brazoria, Brazos, Fayette, Grimes, Harris, Waller, and Washington counties. Actual field investigations were undertaken from 2002 to 2004. Although not directly part of the current study, previous field studies on *T. arkansanum*, which is also of conservation concern (Park and Festerling 1997), were conducted in 2000 by the senior author in Bowie, Delta, Lamar, and Red River counties in northeast Texas. The specimens collected proved to be invaluable to the study reported herewith.

Although not specifically an essential part of the present study, the authors felt that examination of the specimens from Angelina, Houston, and San Augustine counties in central east Texas referred to as *T. arkansanum* by Turner et al. 2003 would benefit the study. These specimens, examined at TAES and TAMU, are referable to *T. dasycarpon*.

The data and specimens collected were used to determine distribution, habitat characteristics, time of flowering, population estimates, range of morphological variation, and for comparisons with similar species.

TAXONOMY

THALICTRUM TEXANUM (A. Gray) Small, Fl. S.E. U.S. 446.1903

Type: Texas. Harris Co.: Moist prairies, Houston, 28 Mar 1872, *E. Hall* 3 (Holotype: GH! Isotypes: NY, US).

Thalictrum debile Buckley var. *texanum* A. Gray in A. Gray et al., Syn. Fl. N. Amer. 1: 18. 1895.

Thalictrum debile Buckley var. *texana* A. Gray ex E. Hall, Plantae Texanae 3. 1873, *nomen nudum*.

Perennial, dioecious herbs. Roots fascicled, yellow when fresh, brown in age [black in age according to Correll and Johnston (1970)]. Stems ascending to erect, 14-35+ cm tall. Leaves generally clustered near the base, generally sparse above, reduced in size from base to apex, biternate, petioles 1-9 cm long, glabrate, irregularly angled, primary petiolules 0.5-4.0 cm long, secondary petiolules 1-10 mm long, those of the middle leaflet substantially longer than the lateral one, leaflets orbicular, subrotund, ovate, to reniform, 0.4-6.7(10) x 4-6.2(9) mm, margins entire or crenate to more often (especially the middle leaflet) shallowly to moderately cleft, bases cuneate, apices rounded and entire, surfaces glabrous, palmately 3 (5) nerved from the base, nerves prominent, exserted from the surface, lower surfaces generally whitened. Inflorescence a raceme, 2-10 cm long. Flowers: Sepals white to purplish, lanceolate to ovate, ♂ 1.7-3 mm, ♀ slightly smaller, stamens 10-14, filaments pinkish, 0.5-2.0 mm long, thin, anthers yellow, 1.4-1.8(2) mm long, apices pointed. Pistils ellipsoid, green, ca. 2.2 long, ribbed, styles/stigmas pinkish, ca. 0.8 mm long, curved, the stigmas linear, papillose, extending for most of the length of the style. Achenes 3-4 mm (or more) long, nearly sessile, ellipsoid-ovate, body 1.5-3.5 mm long, glabrous, slightly flattened, prominently 6-8 ribbed, beaks 0.5-1.0 mm long, straight, curved or reflexed, the upper half prominently papillose on one side. Seeds ellipsoid, flattened, glabrous, slightly smaller than the body of the achene.

Distribution. Clay-pan savannahs, alluvial plain terraces, and pimple mound prairies; lower Brazos River drainage (Austin, Brazoria, Brazos, Fayette, Grimes, Harris, Waller, and Washington counties); 12-85 m (Fig. 1).

Phenology. Flowering (late January) February to May.

SPECIMENS EXAMINED: TEXAS. Austin Co.: Stephen F. Austin State Park, 80 m from SW corner of office building near entrance of park, 28 Feb 2003, *Singhurst 14613* (BAYLU); **Brazoria Co.:** Nash Ranch, W of Co. Rd. 25, about 8.7 mi. N of its intersection with TX Hwy 35 in West Columbia, 16 Mar 2004, *Rosen 2701* (BRIT, TEX); Nowatny Prairie, S of CR 18, about 0.4 mi. E of its intersection with Hwy 36, SE of the town of Damon, 21 Mar 2005, *Rosen 3286 and Singhurst* (SBSC); **Brazos Co.:** College Station, Texas, 22 Mar 1948, *Park s.n.* (TAMU); Frequent in moist woods along creek, 9.6 mi. SE of College Station, 26 Mar 1949, *Cory 55203* (SMU); 9 mi. S of A&M College, 11 Mar 1949, *Illige 119* (TAMU); Shady sandy soil, 8 mi. SE of College Station, 11 Mar 1949, *Whizenhunt 19* (TAMU); Damp sandy soil partially shaded area, 6 mi. S of College Station in roadside ditch along TX Hwy 6, 20 Mar 1957, *Cypert 106* (TAMU); Moist post oak woodland, 13 mi. S of College Station near TX Hwy 6, 15 Mar 1970, *Lonard and Bacon 2533* (SAT, SMU); Lick Creek Park SE of College Station, 17 Apr 1986, *Eaglesham 41* (TAMU); Between Lick Creek and Alum Creek, SW 1/4 of Lick Cr. Park, ca. 0.75-0.8 airmiles SSW of parking lot, 17 Mar 1992, *Carr and Manhart 11606* (TEX-LL); Lick Creek Park, W side of drainage ditch and E of Alum Creek ca. 500 ft. by air SW of its jct. with another major creek (either Lick Creek or a tributary), ca. 4.1-4.2 airmiles SSW of St. Rt. 30 bridge over Navasota River at Ferguson Crossing, 13 Apr 1999, *Carr and Linam 18084* (TEX-LL); **Fayette Co.:** Cummins Creek, 10 May 1849, *Wright s.n.* (GH); **Grimes Co.:** Cemetery of St. Holland Baptist Church, TX Hwy 6, 2 mi. N of FM 2, ca. 8 mi. S of Navasota, 23 Feb 1996, *Holmes 8035* (BAYLU); Ca. 500-800 ft. E of Co. Rd. 403 from a point ca. 3.7-3.8 road mi. N of its southern jct. with FM 3090, or ca. 4.1 airmiles N of jct. FM 3090 and St. Rt. 6 (on N side of Navasota), 25 Nov 1998, *Carr and Allen 17932* (TEX-LL); Ca. 500-800 ft. E of Co. Rd. 403 from a point ca. 3.7-3.8 road mi. of its southern jct. with F.M. 3090, or ca. 4.1 airmiles N of jct. FM 3090 and St. Rd. 6 (on N side of Navasota), 3 Mar 1999, *Carr 17939* (TEX-LL); Allen property, 16 Feb 2004, *Singhurst, Carr, Allen and Loring 12717* (BAYLU); Faqua tract, 16 Feb 2004, *Singhurst, Carr, Allen, and Loring 12718* (BAYLU); Roadside of Co. Rd. 403, 1.1 mi. NW of jct. of FM 3090, NE of Navasota, 8 Apr 2006, *Whitehead 66* (TAMU); **Harris Co.:** Moist prairies, Houston, 28 Mar 1872, *Hall s.n.* (GH); Tafton Academy school grounds and adjacent city park, 28 Feb 2003, *Johnson 1343*

(SBSC); Willow Park, jct. of Cliffwood and McDermed Roads, E at 10 m and 90 m under power-line, 28 Jan 2004, *Singhurst and Carr 12,540* (BAYLU); **Waller Co.:** Picnic area, N side of US Hwy 90, 0.4 mi. W of jct. of FM 1489, W of Brookshire, 10 Mar 1985, *Brown 8492* (ASTC, SMU); Small roadside park off of Hwy 90 W of Brookshire, 3 Mar 1986, *Brown 9753* (SBSC); Picnic area on N side of US Hwy. 90, 0.4 mi. W of jct. FM 1489, just W of Brookshire, 26 Mar 1992, *Carr and Diamond 11657* (TEX-LL); N side of US Hwy 90, 0.4 mi. W of jct. FM 1489, just W of Brookshire, 21 Mar 1994, *Carr and Wolfe 13355* (TEX-LL); 2 mi. NW of Pattison, from intersection of Garrett Rd. and Buller Rd., head N 0.3 mi. to where Dry Branch crosses Buller Rd., 6 Apr 2003, *Johnson 1519* (SBSC); Ca. 0.3 mi. N of jct. of Garrett Rd. and Buller Rd., where Buller Rd. crosses Dry Branch, E side of Buller Rd., 28 Jan 2004, *Singhurst and Carr 12541* (BAYLU); **Washington Co.:** Washington Cemetery, Washington Cemetery Rd., 0.9-1.0 road mi. E of jct. TX Hwy 105, 17 Feb 2003, *Singhurst and Carr 11608* (BAYLU); S side of Washington Cemetery Rd. 0.9-1.0 road mi. E of its jct. with St. Rt. 105, just W of Washington on the Brazos State Park. 2.5-2.6 airmiles SSW of St. Rt. 105 bridge over Brazos River, *Carr and Singhurst 21545* (TEX-LL); Friden Church/Cemetery, 6 Feb 2004, *Holmes 12746 and Singhurst* (BAYLU).

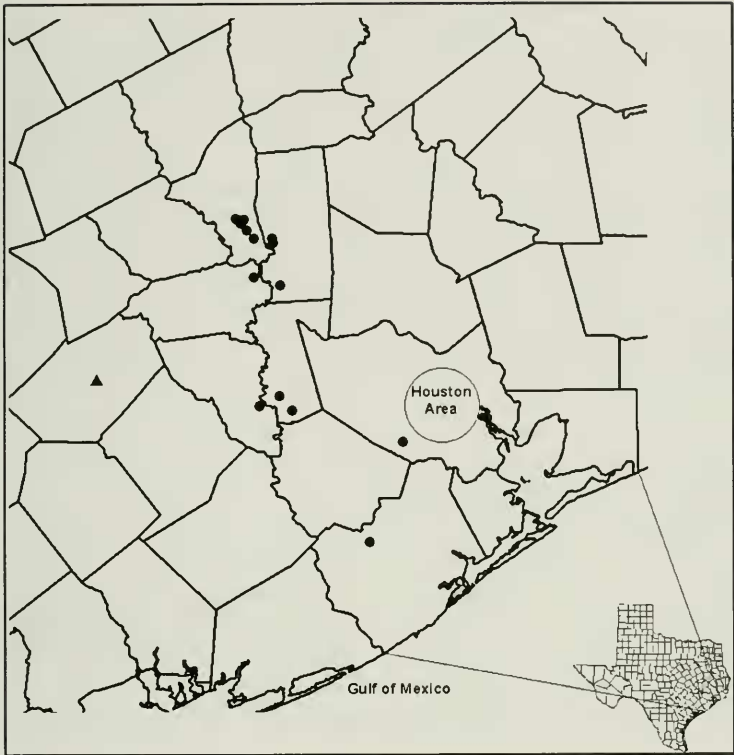


Figure 1. Distribution of *Thalicttrum texanum* in Texas. Counties with dots (●) have extant populations. The record from Fayette County is historical, indicated by a triangle (▲).

DISCUSSION

Thalicttrum texanum is regarded by Park and Festerling (1997) as being closely related to *T. debile* of Alabama, Georgia, and Mississippi, and to *T. arkansanum* of Arkansas, Oklahoma, and Texas. These species are characterized by tuberous roots, reclined to erect stems usually less than 45 cm tall, and leaflets of less than 15 mm in size. Apparently there is considerable difficulty in distinguishing the

three species, other than by distribution, which is further complicated by a lack of herbarium specimens, particularly of *T. texanum* and *T. arkansanum*. Park and Festerling (1997) mention that *T. texanum* is sometimes treated as a variety of *T. debile*, and that *T. arkansanum* possibly should be considered as a variety of *T. debile* also. The following characters from Park and Festerling's key may be used to distinguish the three species. *Thalictrum texanum* is characterized by its erect to ascending habit and ovoid achenes with beaks 0.5–1 mm long, while both *T. debile* and *T. arkansanum* have reclining to decumbent stems and oblong to elliptic-lanceolate achenes with beaks 1.3–2 mm long. Certainly the most impressive distinction involves leaflet characteristics. The terminal leaflet of *T. texanum* is smaller (length: \bar{x} = 6.708, range 4–10, S.D. = 1.764013, n = 12; width: \bar{x} = 6.225, range 5.2–9, S.D. = 1.19782, n = 12) and has whitened lower surfaces. *Thalictrum arkansanum* has larger leaflets (length: \bar{x} = 12.09, range 8–18, S.D. = 2.954908, n = 27; width: \bar{x} = 13.0, range 8–20, S.D. = 2.621954, n = 27) and generally lack the whitened lower surfaces. These characteristics, particularly the leaflet size, can be used to consistently distinguish *T. texanum* from *T. arkansanum*. The few specimens of *T. debile* examined had terminal leaflets that closely approximated those of *T. arkansanum*, suggesting uncertainty as to the distinction of *T. arkansanum*. This disposition agrees with the assessment discussed in Diggs et al. (1999). Thus, it is recommended that *T. texanum* be considered distinct from both *T. arkansanum* and *T. debile*.

The color of the roots is another characteristic that has been used to distinguish *Thalictrum texanum* from both *T. debile* and *T. arkansanum*. In Correll and Johnston (1970) in the key to species and in the description, the roots of *T. texanum* are described as becoming black upon drying, while those of *T. arkansanum* are described as brown. Essentially, Park and Festerling (1997) make the same statements in both the key to species and descriptions, but include *T. debile* ("roots brownish"), a species not within the territorial limits of Correll and Johnston (1970). Nonetheless, black roots have not been detected in any specimens of *Thalictrum texanum* consulted in this study. All roots were brown.

Until this report, *Thalictrum texanum* was known from historical locations and according to Park and Festerling (1997), only two extant populations. These were Lick Creek Park in Brazos County and an unnamed roadside park in Waller County. Turner et al. (2003) listed the species from Brazos, Grimes, and Waller counties. Historical sites included Harris County (the holotype) and an unknown location near Cummins Creek in Fayette County, based upon an 1849 collection made by Charles Wright. As a result of this present study, the species has been discovered in Austin, Brazoria, and Washington counties. Additionally, the species has been "relocated" in Harris County. To date, the species has been confirmed to occupy 13.4 ha (33 acres) in ten distinct populations in Austin, Brazos, Brazoria, Grimes, Harris, Waller, and Washington counties. General locations are given in the list of exsiccatae.

Thalictrum texanum is primarily distributed in the southeast portions of the Blackland Prairies and Post Oak Savannah vegetational areas at sites that may be described as transitional between the two areas; i.e., a blending of the characteristics of the two areas. One population (Brazoria County) is known from the Gulf Prairies and Marshes vegetation area. Generally, the species is found to occur on three distinct soil formations: clay-pan savannahs, alluvial plain terraces, and pimple mound prairies. More specifically, *T. texanum* occurs in woodlands and woodland margins on both uplands and creek terraces on soils with a surface layer of sandy loam over clay-pans.

At Stephen F. Austin State Park in Austin County, *Thalictrum texanum* inhabited an alluvial terrace dominated by *Carya illinoensis*, *Ulmus crassifolia*, and *Plantanus occidentalis*. Non-woody vegetation included *Carex cherokeensis*, *Anemone heterophylla*, *Nothoscordum bivalve*, *Ranunculus carolinianus*, and *Scutellaria parvula*.

In Brazoria County, *Thalictrum texanum* was recently discovered on remnant prairies that are maintained by mowing and haying. The plants were growing on the fine sandy loam soils of pimple mounds. Pimple mounds were dominated by *Agrostis elliottiana*, *Agrostis hyemalis* var. *hyemalis*, *Carex meadii*, *Panicum* sp., and *Vulpia octoflora* var. *octoflora*. Other associates included *Anagallis minima*, *Anemone berlandieri*, *Dichondra carolinensis*, *Drosera*

brevifolia, *Erigeron tenuis*, *Euphorbia texana*, *Houstonia pusilla*, *Krigia dandelion*, *Lepuropetalon spathulatum*, *Nothoscordum bivalve*, *Oenothera laciniata*, *Polygala incarnata*, *Scleria ciliata* var. *glabra*, *Scutellaria parvula*, *Silphium gracile*, and *Triodanis perfoliata* var. *perfoliata*.

At Lick Creek Park in Brazos County, the species occurred along the margins of mostly deciduous woodland on an alluvial terrace, in partial shade of *Quercus nigra*, *Ulmus* sp., and *Ilex vomitoria*. Other vegetation included *Carex cherokeensis*, *Tridens flavus*, *Elephantopus carolinianus*, *Salvia lyrata*, *Verbesina virginica*, and *Schizachyrium scoparium*.

At the Allen Ranch in Grimes County, the species occurred in abundance along the margins of upland woodlands dominated by *Quercus stellata* and *Juniperus virginiana*. Shrub components included *Ilex vomitoria*, *Callicarpa americana* and *Vaccinium arboreum*. During the springtime, margins of the woodlands were dominated by *Carex complanata* and in the fall by *Schizachyrium scoparium*. The surface layer of the soil is slightly acidic fine sandy loam, while the upper part of the subsoil is slightly acid, nearly impermeable clay that ultimately produced a perched water table during the wet season (December to March). This combination keeps the soils very moist during periods of active growth of *Thalictrum texanum* and at the same time limits root penetration.

At the Washington Cemetery in Washington County, *Thalictrum texanum* occurred on a clay-pan savanna site dominated by mostly *Quercus stellata* subtended by small mottes of *Ilex vomitoria* and occasional clumps of *Schizachyrium scoparium*, *Saxifraga texana*, and *Claytonia virginica*.

SUMMARY

Based upon our findings, it is recommended that *Thalictrum texanum* be considered distinct from both *T. debile* and *T. arkansanum*, which may be conspecific. It is further suggested that *T. texanum* be considered to be of conservation concern, largely on the basis of the limited number of extant populations.

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